Northwest Fisheries Science Center

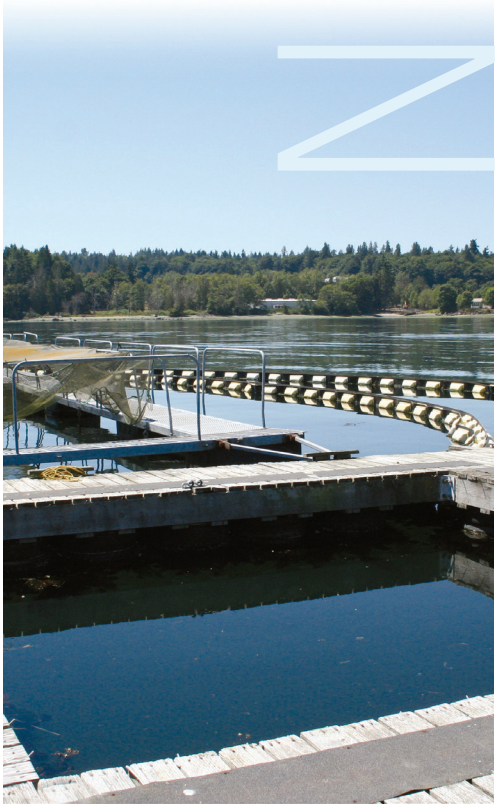
Aquaculture

2011

NOAA FISHERIES SERVICE

Aquaculture can help meet the growing demand for healthy seafood. NOAA's Northwest Fisheries Science Center is a national leader in the research, development, and testing of sustainable aquaculture technologies and practices.

www.nwfsc.noaa.gov
http://aquaculture.noaa.gov



Need for Safe and Sustainable Aquaculture

Seafood provides a highly nutritious source of protein for people worldwide and consumer demand for seafood continues to increase as the world's population grows. However, catch totals from wild capture fisheries have been stable for the last few decades. Aquaculture production, growing by 7% per year since the 1970s, is an important component of meeting these increased demands.

Seafood is high in protein and low in saturated fat and contains an abundance of minerals and essential amino acids. It is an excellent source of omega-3 fatty acids, and is very digestible. Currently, the U.S. imports about 88% of its seafood, approximately half of which is from aquaculture, raising concern about food security as the U.S. relies on other nations for an important component of its diet. It also raises concern about environmental sustainability and food safety as some aquaculture export countries have less stringent health requirements and only about 2% of seafood imports into the U.S. are inspected.

As the nation's oceans agency, the National Oceanic and Atmospheric Administration's (NOAA's) role is to ensure that domestic aquaculture proceeds in an environmentally responsible manner that is consistent with the agency's responsibilities of protecting wild fishery stocks and the quality of marine ecosystems. NOAA must also ensure that aquaculture is compatible with other uses of the marine environment.

While the U.S. needs a robust sustainable aquaculture industry as a complement to commercial fisheries, commercial aquaculture often relies on ecosystems that are already degraded, such as U.S. coastal areas and the ocean. The protection of fragile or degraded coastal areas is one of the most important reasons for the center to develop, test, and share the best possible aquaculture practices with farmers and other researchers. Poor or outdated aquaculture practices have the potential to impact an already fragile marine environment. It is also important to note that aquaculture done well may provide ecological benefits to an area, such as the increased abundance of submerged grasses and other important habitat in and around shellfish farms.

What are the environmental concerns about aquaculture?

While cultured seafood may help reduce pressure on overexploited wild stocks, several environmental concerns remain:

- use of forage fish for protein and oil components of feeds
- genetic impacts of escapes on wild stocks of the same species
- ecological impacts of escapes on natural ecosystems, including competition
- transfer of disease and parasites to natural populations
- pollution from wastes and overfeeding

What are the human health concerns about aquaculture?

- addition of antibiotics or hormones in cultured seafood
- nutritional value of cultured seafood
- contaminants in feeds and transfer to cultured fish

Highlights of NWFSC Research:

The Northwest Fisheries Science Center is a leader in fulfilling NOAA's legal mandate to reduce impacts on marine forage fish populations and creating economic advantages for the industry.

Maximizing Human Health Benefits - NWFSC scientists are also conducting cutting-edge research to develop aquaculture practices to provide maximum human health benefits. For example, to increase nutritional content of farmed seafood, the Center scientists are studying beneficial fatty acid distribution to develop fish diets that improve human health benefits, such as increased concentration and transmission of omega-3 fatty acids. These compounds cannot be manufactured by the body but are essential to human health as they fill a crucial role in brain function and cardio-vascular health as well as normal growth and development. In collaboration with the Washington State Department of Health and oyster growers, Center scientists are also developing improved diagnostic methods for detection of human and shellfish pathogens. Additional studies focus on how environmental conditions like those created by climate change and ocean acidification affect the abundance and virulence of marine bacteria.

Increasing the Value of Seafood – Center scientists are developing feeding practices that will increase economic value of farmed seafood. Practices under development include recovery of fish oil and meal from commercial fish processing wastes, reduction of timely and costly feed enrichment processes through development of microparticulate feeds for larval marine fish, and determination of minimal levels of fish oil necessary for human health benefits while retaining fish growth, disease resistance, and reproduction. Many of these cost-savings efforts will also reduce demand for wild caught marine forage fish.

Reducing Environmental Impact – Led by Center scientists, NOAA and the U.S. Department of Agriculture have collaborated on the development of alternative aquaculture feeds, including plant- and seed-based protein and oil ingredients. Research includes a variety of food sources including soy beans, barley, rice, canola, algae, and wastes from bioenergy production. Alternatives to fish meal and fish oil will increase industry stability, decrease diet costs, and reduce demand for marine forage fish populations by the aquaculture industry in the future.

NWFSC scientists are exploring the genetic impacts of commercial aquaculture escapes on natural populations and evaluating methods to reduce them. The research is focused on comparing the relative genetic risk of escapes on wild stocks with conventional fishing activities, natural species selection, stock enhancement, and habitat destruction. Research to evaluate methods to prevent interbreeding between natural and cultured populations, such as sterilization in aquaculture finfish, is ongoing.

In addition, the NWFSC is supporting modeling efforts to estimate environmental impacts of finfish aquaculture escapes. Potential ecological impacts of escapes include competition with native species for space and food resources, disease transfer, and increased predation on natural populations. The model will distinguish impacts from purposeful releases of cultured fish (for rebuilding populations) with unintentional escapes on both a small scale, such as periodic escape of a few fish, and with larger events, such as complete failure of a net-pen. The model will be applied to common cultured species such as Pacific and black cods, Pacific rockfish, winter flounder, and red drum. The model will be used by fisheries managers and decision makers to assess potential impacts of aquaculture escapes for permitting and monitoring decisions.

The Northwest Fisheries Science Center's goal is to provide state-of-the-art science and technology to support aquaculture while protecting and maintaining ecosystem health.

www.nwfsc.noaa.gov
http://aquaculture.noaa.gov